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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/815,734	04/02/2004	Taiji Torigoe	2004-0509A	1544

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EXAMINER

MCNEIL, JENNIFER C

ART UNIT PAPER NUMBER

1775

DATE MAILED: 01/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/815,734

Applicant(s)

TORIGOE ET AL.

Examiner

Jennifer C. McNeil

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Specification

The substitute specification filed October 31, 2005 has not been entered because it does not conform to 37 CFR 1.125(b) and (c) because: a marked up version of the specification has not been received. Please refer to 37 CFR 1.125 (c), which states:

(c) A substitute specification submitted under this section must be submitted with markings showing all the changes relative to the immediate prior version of the specification of record. The text of any added subject matter must be shown by underlining the added text. The text of any deleted matter must be shown by strike-through except that double brackets placed before and after the deleted characters may be used to show deletion of five or fewer consecutive characters. The text of any deleted subject matter must be shown by being placed within double brackets if strike-through cannot be easily perceived. An accompanying clean version (without markings) must also be supplied. Numbering the paragraphs of the specification of record is not considered a change that must be shown pursuant to this paragraph.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claim 40 is rejected under 35 U.S.C. 102(a) as being anticipated by Subramanian (US 2003/0211354). Subramanian teaches a thermal barrier coating for a turbine engine substrate material. The metal substrate may be considered the base material. The ceramic layer comprises

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zirconia stabilized with ytterbia, and has a porosity of 10-40 wt%. The porosity may include generally spherical or other shaped pores, horizontal or generally vertical cracks (paragraph 20). A bond coating may be provided between the substrate and the ceramic layer. The coating may be deposited via thermal spray.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 24, 25, 26, 28, 29, 31, 32, 34, 35, 37, 38, 39, 40, 41, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rickerby et al (US 6,025,078) in view of Nagaraj et al (US 2005/0170200). Rickerby teaches a thermal barrier coating for a turbine substrate. Rickerby teaches a thermal barrier coating for a metal turbine substrate (considered the base material). The ceramic coating comprises 4-20 wt% of a first oxide which may be ytterbia, and 5-25 wt% of a second oxide which may be erbia. A bond coating may be provided between the substrate and the ceramic layer. The coating may be applied via plasma spray (considered thermal spray). Rickerby does not specify the formation of cracks in the ceramic coating. Nagaraj teaches a thermal barrier coating comprising a ceramic layer of stabilized zirconia having vertical microcracks extending through the thickness thereof. The microcracks are formed by thermal spray. The microcracks provide an improved erosion resistance. It would have been obvious to one of ordinary skill in the art at the time of the

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invention to form microcracks like those taught by Nagaraj in the ceramic coating of Rickerby to provide an improved erosion resistance thereto. Regarding claims 29 and 35, one of ordinary skill would have found it obvious to provide more than one ceramic layer as duplication of parts would provide increased thermal protection. Regarding the method claims, both Rickerby and Nagaraj teach application of the ceramic coatings via thermal spray.

Claims 27, 30, 33, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rickerby et al (US 6,025,078) in view of Nagaraj et al (US 2005/0170200) and further in view of Subramanian (US 2003/0211354). Rickerby and Nagaraj teach ceramic coatings as discussed above, but do not specify the amount of porosity of the layers. Subramanian teaches a ceramic layer comprises zirconia stabilized with ytterbia, and has a porosity of 10-40 wt%. The porosity may include generally spherical or other shaped pores, horizontal or generally vertical cracks (paragraph 20). A bond coating may be provided between the substrate and the ceramic layer. The coating may be deposited via thermal spray. The porosity increases the sintering resistance and abrasability. One of ordinary skill in the art at the time of the invention would have found it obvious to provide the thermal barrier coating of Rickerby as modified by Nagaraj with the porosity taught by Subramanian to improve the sintering resistance and abrasability of the coating.

Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rickerby et al (US 6,025,078) in view of Subramanian (US 2003/0211354). Rickerby teaches a thermal barrier coating for a turbine substrate. Rickerby teaches a thermal barrier coating for a metal turbine substrate (considered the base material). The ceramic coating comprises 4-20 wt% of a first oxide which may be ytterbia, and 5-25 wt% of a second oxide which may be erbia. A bond coating may be provided

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between the substrate and the ceramic layer. The coating may be applied via plasma spray (considered thermal spray). Rickerby does not specify the porosity of the layer. Subramanian teaches a thermal barrier coating for a turbine substrate as discussed above, and further teaches a porosity of 10-40% by volume. The porosity increases the sintering resistance and abrasability. The porosity may be provided in the form of generally vertical cracks. One of ordinary skill in the art at the time of the invention would have found it obvious to provide the thermal barrier coating of Rickerby with the porosity taught by Subramanian to improve the sintering resistance and abrasability of the coating.

Response to Arguments

Applicant's arguments filed October 31, 2005 have been fully considered but they are not persuasive regarding claims 40 and 41, and moot in light of the new rejections made above regarding claims 24-39, and 42. The 102 rejections over Gorman and Rickerby have been rendered moot by applicant's amendments. The 102 rejection over Subramanian and the 103 rejection over Rickerby in view of Subramanian is held for claims 40 and 41, respectively.

Applicant argues that Subramanian puts no limitations upon the direction of the cracks, and can include both horizontal and vertical cracks. Subramanian teaches that voids may be provided in the form of pores or cracks. The cracks may be generally vertical, and are formed during the thermal spray process. The instant claims refer to the cracks being plus or minus 40 degrees relative to a normal line to a face of the ceramic, which is interpreted to mean the cracks may be from 50 degrees to 130 degrees on a 180 scale flat surface. This means there may be a variation of 80 degrees total between the cracks. This is a wide range with respect to the perpendicular 90 degrees which is normal to the face of the ceramic layer. Subramanian's teaching of "generally vertical" is

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considered to read upon this range of angles. Regarding applicant's argument that Subramanian may include horizontal and vertical cracks, there is no limitation in the instant claims that there may not be a presence of additional voids.

Regarding claim 40, Subramanian teaches that the cracks are generated in the material by differential thermal expansion during the deposition process, and not due to the fugitive material as applicant argues (paragraph 0020). It is noted that claim 40 does not limit the direction of the cracks formed therein.

Applicant's amendment has limited at least some of the claims to cracks having a specific orientation, thereby necessitating the new rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer C. McNeil whose telephone number is 571-272-1540. The examiner can normally be reached on 9AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on 571-272-1535. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jennifer C McNeil
Primary Examiner
Art Unit 1775

JCM